

AMENDMENTS TO THE SPECIFICATION

Please substitute the following Specification. Pursuant to 37 CFR 1.25, a “clean” version of the substitute specification is provided below, followed by a marked up version showing the changes made relative to the previous version. The substitute specification contains no new matter.

(Clean copy of Specification)

DEMOUNTABLE RIM WITH RUN FLAT CAPABILITY

I - Background of the Invention

Field of invention.

The present invention relates to a tire rim assembly which allows a vehicle to run with a flat tire. More particularly, the present invention relates to a demountable tire rim assembly with a spare inner wheel and having two annular parts which support the spare inner wheel and permit engagement of the spare inner wheel with the ground during the run flat condition.

Description of prior art.

Within the prior art, there is US Patent 2105317 which discloses an aircraft wheel made of two pieces. However, this tire rim is not used in automobiles and in addition, it is not prepared to mount a spare inner wheel.

US Patent 3037815 shows a wheel in which the tire rim has a thread to vary the tread. This wheel is intended to be used in tractors and lacks a spare inner wheel.

US Patent 4989657 is a modular wheel consisting of two main pieces and a third piece to ensure the tire grip. These pieces are joined by means of bolts but they lack other coupling means. Such a structure is not adapted for the assembly of a spare inner wheel.

US Patent 5022450 discloses a set of safety tire rim and demountable wheel. Both parts of the tire rim are joined by means of bolts and lack other coupling means. There is

an insert to run with the flat tire which is simply added but does not determine the tire rim structure.

None of these prior art tire rim assemblies are prepared to have a spare wheel and at the same time, be demountable with a threaded or bayonet type coupling means.

II - Summary of the Invention

The present demountable tire rim assembly having a spare inner wheel includes two complementary annular parts provided with threaded reciprocal coupling members. Both complementary annular parts form side holding rims for the tire beads and in the central part of the annular parts, they provide support for the spare inner wheel.

Objects and Advantages.

An advantage of the present tire rim assembly is that it provides a structure to mount and easily remove the spare inner wheel.

Another advantage is that the present invention simplifies the placement and removal of tubeless tires from the tire assembly because there is no need of using levers, as usually occurs with one-piece tire rims. This is very significant in low profile tires, which due to the height of their lateral walls, are less flexible making manipulation in conventional tire rims difficult.

A further advantage of the present tire rim assembly is that it is provided with an annular depression to receive the spare inner wheel which allows to run with tubeless tires without deteriorating. All the well-known prior art systems, although having their contact

surfaces lubricated, do not have an annular depression for the spare wheel to be rotated or float relative to the tire rim. Therefore, contact between the spare inner wheel and the tire causes the tire to deteriorate because the difference in diameters causes a destructive attrition between the tire and spare inner wheel.

In addition, the present tire rim assembly is compatible with different antifriction means such as rollers at the base of the inner wheel or bushings or anti-friction coatings between the tire assembly and the inner wheel. All this, on the one hand, facilitates the relative sliding between the inner wheel and the tire assembly, and on the other hand, contact between the inner wheel and the tire, thus avoiding deterioration of the tire.

The present tire rim assembly is compatible with the use of inner wheels made of different materials, namely plastic, thermoplastic, elastomer, flexible, semiflexible, semirigid or rigid. The use of these materials and the chance of incorporating easier holes allow the inner wheel to be resistant and at the same time, light and safe.

The present tire rim assembly is also compatible with the use of spare inner wheels, either one-piece or, for instance, consisting of three or more sectors connected to one another through flexible and strong bonding elements, which allow them to behave like one-piece wheels and allow them to be warped, lessening their major diameter so as to be placed and removed from the inside of the tire which inner mouth has a shorter diameter.

Yet a further advantage of the present tire rim assembly is high safety. This is due

to the fact that the assembly is provided with complement threaded or bayonet type reciprocal coupling means with a plurality of connection passages wherein bolts with nut, lockpins, annular groove with cross section washer, etc. are provided.

Still further advantage is that the present tire rim assembly allows to form an aerodynamic and aesthetic wheel and permits the assembly to adapt to measurements standardized by international regulations which govern this art. Also the modified tire is intended to decrease friction with the inner wheel, determine a guided movement on it and decrease rotating displacement with reference to the tire rim when running under the run flat condition.

III - Description of the Drawings

FIG 1. is a perspective view of the demountable tire rim assembly having a tire mounted thereon and spare inner wheel in accordance with the present invention;

FIG 2. Is a enlarged perspective view of the demountable rim assembly in accordance with the present invention;

FIG 3 is a cross-sectional view of the demountable rim assembly in accordance with the present invention;

FIG 4-6 are cross-ection views of the annular parts members in accordance with the present invention;

FIG. 7A is a top-view of the annular parts members in accordance with the present invention;

FIG. 7B is a perspective view of a tire bead in accordance with the present invention;

FIGS. 8-10 are cross-sectional views of the spare inner wheel in accordance with the present invention;

FIGS 11-14 are cross-sectional views of the spare inner wheel mounted to the annular parts in accordance with the present invention;

FIGS 15-21 are perspective views of the spare inner wheel in accordance with the present invention;

FIGS. 22-24 are side views of various embodiments of the spare inner wheel in accordance with the present invention;

FIG. 25A is a perspective view of the threaded sectors on the perimeter of the annular parts in accordance with the present invention; and

FIGS. 25B and 25C are cross-views showing the locking movement of the annular parts in accordance with the present invention.

IV – Detailed Description of the Invention

As it can be observed in figures 1 and 2, the present invention is related to a demountable tire rim assembly (1) having a spare inner wheel (3) which is integrated by two complementary annular parts (4)(5) having threaded reciprocal coupling means (10).

The body of the demountable tire rim (1) comprises two complementary annular parts (4)(5) which consist of a first part (4) and a second part (5). Both complementary

annular parts (4) (5) are provided with side holding rims (6) (13) for the tire (2).

According to figure 7A, between the holding rim (6) or (13) and an adjacent rim (7a), a wedge is formed (7) for the tire (2) bead (51). The possibility that the adjacent rim (7a) has gearing means (43) with similar means (53) provided by the tire (2) bead (51) has been provided. This allows an integral assembly between the tire rim (1) and the tire (2) (See figure 7b). FIG.7A illustrates a plurality of recesses and ledges 43 which are regularly spaced and extend around the outer perimeter of the annular parts 4, 5, next to the side rims 6, 13, to limit rotation of the tire 2 on the tire rim assembly when running under the run flat condition.

In the central part of the tire rim assembly (1) there are assembly means for one or more spare wheels (3). The assembly means includes a central depression (9) that may be even or grooved (17) (FIG. 11) and which is limited by side edges (8) (12) of annular parts 4,5 and by central rims (15) (FIG. 3) which are supported against the side edges (8) (12). When there are two or more spare wheels (3), a separating rim (16) can be added (16). (See figures 1, 2, 3, 4, 5, 6, 12 and 14).

The two complementary annular parts (4) (5) have reciprocal coupling means or threads (10). (See figures 1, 2 and 25A-C). In one case, the reciprocal coupling means may consist of each continuous threads (10) formed at the above mentioned complementary annular parts (4) (5). In another case, the reciprocal coupling means consists of a plurality of threaded sectors (40) on the edge of the whole perimeter of both

adjacent segments of the tire rim (1) which have, on one of their ends, an elevated part as a stop (41), inserted with sectors without a thread (42), which surface is at a lower level in relation to the threaded sectors (40). The different sectors, 40, 42 have the same width so that they can be inserted to one another, to be fixed together by means of threading rotating movements between the annular parts. (See figures 25A, 25B and 25C).

The reciprocal coupling means are complemented by means of interconnection and fixation means (19) of the complementary annular parts (4)(5). These interconnection and fixation means (19) include a plurality of equal and equally-spacedly openings distributed on flanges 20 placed on the perimeter of both edges, which, one opposite the other, form passages for fixation screws or for bolts with lockpin washer (See detail in figure 1 and figure 2).

In figures 1, 4, 5 and 6, it can be seen that both complementary annular parts (4)(5) define a joint area (11) that may be even or with annular ledges. The annular ledges can be facing or insertable. In this joint area, there is an elastomeric joint (14) that may also be even or with annular ledges.

Concerning the spare wheel (3), it can be grooved (55)(24)(25) or even (22) in one-piece, one-piece with recesses (29) on the even periphery (22), one-piece with recesses (30) on the inner edge (23) or either comprised by sectors related to an annular member which goes through them, as shown in FIGS 8-13 and 15-19. FIG.13 illustrates the side retention member 18 on the annular parts 4,5 which is engageable with the annular

projection member 26 extending axially from the spare inner wheel 3. FIG. 19 illustrates roller bearings 27 which may be inserted between the spare inner wheel 3 and the annular depression.

Different examples of spare wheels (3) are illustrated in figures 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23 and 24.

With regard to the tire, in addition to the gearing means (53), the tire possesses a reinforcement annular member (52) arranged within the bead (51) (See figures 3 and 7B).

In Figures 1 and 2, some inner ledges (50) of the above mentioned tire (2) can be seen to face and facilitate contact with the spare wheel (3) under the run flat tire condition.

It is evident that when the present invention is put into practice, modifications may be made regarding certain construction and shape details, without departing from the basic principles which are clearly encompassed in the following claims.

V - Abstract

The present invention is related to a demountable tire rim assembly having a spare inner wheel which permits running during the run flat condition. The demountable tire rim includes two complementary annular parts provided with reciprocal threaded coupling members on the perimeter of the annular parts which include threaded and non-threaded sectors which are structurally arranged to secure the annular parts together.

(Marked up Copy of Specification)

DEMOUNTABLE RIM WITH RUN FLAT CAPABILITY

I - Background of the [i]Invention

Field of invention.

The present invention relates to a tire rim assembly which allows a vehicle to run with a flat tire. More particularly, ~~[[it]]~~ the present invention relates to a **demountable tire rim assembly with a spare inner wheel and tire for said tire rim** ~~which~~ having two ~~[[main]] annular parts can be easily disassembled to place or remove the spare inner wheel that is placed into the wheel~~ which support the spare inner wheel and permit engagement of the spare inner wheel with the ground during the run flat condition.

Description of prior art.

Within the prior art, there is US Patent 2105317 which discloses an aircraft wheel made of two pieces. However, this tire rim is not ~~apt to be~~ used in automobiles and in addition, it is not prepared to ~~[[carry]]~~ mount a spare inner wheel ~~inside~~.

US Patent 3037815 shows a wheel in which the tire rim has a thread to vary the tread. This wheel is intended to be used in tractors and lacks ~~[[the]]~~ a spare inner wheel.

US Patent 4989657 is a modular wheel consisting of two main pieces and a third piece to ensure the tire grip. These pieces are joined by means of bolts but they lack other coupling means. ~~[[It]]~~ Such a structure is not ~~prepared~~ adapted for the assembly of a spare inner wheel, ~~either~~.

US Patent 5022450 discloses a set of safety tire rim and demountable wheel. Both parts of the tire rim are joined by means of bolts and lack other coupling means. There is an insert to run with the flat tire which is simply added but does not determine the tire rim structure.

None of these ~~well-known~~ prior art tire rim ~~[[s is]]~~ assemblies are prepared to have a spare wheel and at the same time, be demountable with a threaded or bayonet type coupling means.

II - Summary of the ~~[[i]]~~Invention

The present demountable tire rim ~~[[with]]~~ assembly having a spare inner wheel ~~comprises~~ includes two complementary annular parts provided with threaded reciprocal coupling ~~[[means]]~~ members. Both complementary annular parts form side holding ~~[[edges]]~~ rims for the tire beads and in the central part of the annular parts, they ~~form the assembly for one or more~~ provide support for the spare inner wheel~~[[s]]~~.

Objects and Advantages.

An advantage of the present tire rim assembly is that it ~~allows~~ provides a structure to ~~[[place]]~~ mount and easily remove the spare inner wheel.

Another advantage is that ~~[[it]]~~ the present invention simplifies the placement and removal of tubeless tires ~~which are easily performed and~~ from the tire assembly because there is no need of using levers, as ~~[[it]]~~ usually occurs with one-piece tire rims. This is very significant in low profile tires~~[[in]]~~, which due to the height of their lateral walls, ~~these~~

~~ones~~ are less flexible making manipulation in conventional tire rims difficult.

A further advantage of the present tire rim assembly is that it is provided with ~~assembly means like~~ an annular depression ~~wherein to receive~~ the spare inner wheel ~~wedges and slides~~, which allows to run with tubeless tires without ~~them being deteriorated~~ deteriorating. All the well-known ~~similar prior art~~ systems, although having their contact surfaces lubricated, do not have an annular depression for the spare wheel to be ~~slided~~ rotated or float relative to the tire rim. Therefore, contact between the spare inner wheel and the tire causes ~~[[its]] the tire to deteriorat[[ion]]e~~ because the difference in diameters causes a destructive attrition between ~~both of them~~ the tire and spare inner wheel.

In addition, the present tire rim assembly is compatible with different antifriction means such as rollers at the base of the inner wheel or ~~burnishings~~ bushings or anti—friction coatings ~~[[in]] between the tire assembly means of said and the~~ inner wheel. All this, on the one hand, facilitates the relative sliding between the inner wheel and the tire ~~[[rim]] assembly~~, and on the other hand, contact between the inner wheel and the tire, thus avoiding deterioration of the tire.

The present tire rim assembly is compatible with the use of inner wheels made of different materials, namely plastic, thermoplastic, elastomer, flexible, semiflexible, semirigid or rigid. The use of these materials and the chance of incorporating easier holes allow the inner wheel to be resistant and at the same time, light and safe.

~~[[This]]~~ The present tire rim assembly is also compatible with the use of spare inner

wheels, either one- piece or ~~[[not]]~~, for instance, consisting of three or more sectors connected to one another through flexible and strong bonding elements, which allow them to behave like one-piece wheels and allow them to be warped, lessening their major diameter so as to be placed and removed from the inside of the tire which inner mouth has a shorter diameter.

Yet a further advantage of the present tire rim assembly is high safety. This is due to the fact that ~~[[it]]~~ the assembly is provided ~~[[to]]~~ with complement threaded or bayonet type reciprocal coupling means with a plurality of connection passages wherein bolts with nut, lockpins, annular groove with cross section washer, etc. are ~~arranged~~ provided.

~~[[A yet]]~~ Still further advantage is that the present tire rim assembly allows to form an aerodynamic and aesthetic wheel and ~~its conformation allows it~~ permits the assembly to adapt to measurements standarized by international regulations which govern ~~[[the]]~~ this art. ~~[[And]]~~ Also the modified tire is intended to decrease friction with the inner wheel, determine a guided movement on it and decrease rotating displacement with reference to the tire rim ~~[[upon]]~~ when running under the run flat condition.

III - Description of the Drawings

FIG 1. is a perspective view of the demountable tire rim assembly having a tire mounted thereon and spare inner wheel in accordance with the present invention;

FIG 2. Is a enlarged perspective view of the demountable rim assembly in accordance with the present invention;

FIG 3 is a cross-sectional view of the demountable rim assembly in accordance with the present invention;

FIG 4-6 are cross-section views of the annular parts members in accordance with the present invention;

FIG. 7A is a top-view of the annular parts members in accordance with the present invention;

FIG. 7B is a perspective view of a tire bead in accordance with the present invention;

FIGS. 8-10 are cross-sectional views of the spare inner wheel in accordance with the present invention;

FIGS 11-14 are cross-sectional views of the spare inner wheel mounted to the annular parts in accordance with the present invention;

FIGS 15-21 are perspective views of the spare inner wheel in accordance with the present invention;

FIGS. 22-24 are side views of various embodiments of the spare inner wheel in accordance with the present invention;

FIG. 25A is a perspective view of the threaded sectors on the perimeter of the annular parts in accordance with the present invention; and

FIGS. 25B and 25C are cross-views showing the locking movement of the annular parts in accordance with the present invention.

[[III]] IV – Detailed [d]Description of the Invention

As it can be observed in figures 1 and 2, the present invention is related to a demountable tire rim assembly (1) ~~[[with]]~~ having a spare inner wheel (3) which is integrated by two complementary annular parts (4)(5) ~~provided with~~ having threaded reciprocal coupling means (10).

The body of the demountable tire rim (1) comprises two complementary annular parts (4)(5) which consist of a first part (4) and a second part (5). Both complementary annular parts (4) (5) are provided with ~~[[each]]~~ side holding rims (6) (13) for the tire (2).

According to figure 7A, between the holding rim (6) or (13) and an adjacent rim (7a), a wedge is formed (7) for the tire (2) bead (51). The possibility that the adjacent rim (7a) has gearing means (43) with similar means (53) provided by the tire (2) bead (51) has been provided[; t] . This allows an integral assembly between the tire rim (1) and the tire (2) (See figure 7b). FIG.7A illustrates a plurality of recesses and ledges 43 which are regularly spaced and extend around the outer perimeter of the annular parts 4, 5, next to the side rims 6, 13, to limit rotation of the tire 2 on the tire rim assembly when running under the run flat condition.

In the central part of the tire rim assembly (1) there are assembly means for one or more spare wheels (3). ~~[[These]]~~ The assembly means ~~comprise~~ includes a central depression (9)[[. T]] that may be even or grooved (17) (FIG. 11) and which is limited by side edges (8) (12) of annular parts 4,5 and by central rims (15) (FIG.3) which are

supported against ~~[[said]]~~ the side edges (8) (12). When there are two or more spare wheels (3), a separating rim~~[[s]]~~ (16) can be added (16). (See figures 1, 2, 3, 4, 5 ~~[[and]]~~ 6, 12 and 14).

The two complementary annular parts (4) (5) have reciprocal coupling means ~~based on~~ or threads (10). (See figures 1 ~~[[and 2]]~~ 2 and 25A-C). In one case, the reciprocal coupling means may consist of each continuous threads (10) formed at the above mentioned complementary annular parts (4) (5). In another case, the reciprocal coupling means consists of a plurality of threaded sectors (40) on the edge of the whole perimeter of both adjacent segments of the tire rim (1) which have, on one of their ends, an elevated part as a stop (41), inserted with sectors without a thread (42), which surface is at a lower level in relation to the threaded sectors (40)~~[[,]]. these ones being~~ The different sectors, ~~[[of]]~~ 40, 42 have the same width~~[[,]]~~ so that they can be inserted to one another, to be fixed together by means of threading ~~spindrift~~ rotating movements between the annular parts. (See figures 25A, 25B and 25C).

The reciprocal coupling means are complemented by means of interconnection and fixation means (19) of the complementary annular parts (4)(5). These interconnection and fixation means (19) ~~comprise~~ include a plurality of equal and equally-spacedly openings distributed on flanges 20 placed on the perimeter of both edges, which, one opposite the other, form passages for fixation screws or for bolts with lockpin washer (See detail in figure 1 and figure 2).

In figures 1, 4, 5 and 6, it can be seen that both complementary annular parts (4)(5) define a joint area (11) that may be even or with annular ledges. The annular ledges can be facing or insertable. In this joint area, there is an elastomeric joint (14) that may also be even or with annular ledges.

Concerning the spare wheel (3), it can be grooved ~~[[(23)]]~~ (55)(24)(25) or even (22) in one- piece, one- piece with recesses (29) on the even periphery (22), one-piece with recesses (30) on the inner edge (23) or either comprised by sectors related to an annular member which goes through them, as shown in FIGS 8-13 and 15-19. FIG.13 illustrates the side retention member 18 on the annular parts 4,5 which is engageable with the annular projection member 26 extending axially from the spare inner wheel 3. FIG. 19 illustrates roller bearings 27 which may be inserted between the spare inner wheel 3 and the annular depression.

Different examples of spare wheels (3) are illustrated in figures 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23 and 24.

With regard to the tire, in addition to the gearing means (53), ~~[[it]]~~ the tire possesses a reinforcement annular member (52) arranged within the bead (51) (See figures 3 and 7B).

In Figures 1 and 2, some inner ledges (50) of the above mentioned tire (2) can be seen to face and facilitate contact with the spare wheel (3) under the run flat tire ~~running~~ condition~~[[s]]~~.

It is evident that when the present invention is put into practice, modifications may be made regarding certain construction and shape details, without departing from the basic principles which are clearly encompassed in the following claims.

~~{IV}~~ V – Abstract

The present invention is related to a demountable tire rim assembly (1) with having a spare inner wheel (3) ~~with antifriction systems which [[allow]] permits running with tubeless tires during the run flat condition. Without their deterioration, t~~ The demountable tire rim (1) ~~comprises~~ includes two complementary annular parts (4)(5) provided with reciprocal threaded coupling ~~means (10)~~ members on the perimeter of the annular parts which include threaded and non-threaded sectors which are structurally arranged to secure the annular parts together. ~~The body of the demountable tire (1) comprises two complementary annular parts (4)(5) which consist of a first part (4) and a second part (5). Both complementary annular parts (4)(5) are provided with each side holding rims (6)(13) for the tire (2). The modifications of the tires (2) have the purpose of adapting them to run under flat condition and determine a guided movement on it, and in relation to the tire rim, it decreases the rotating displacement on it.~~